***2011 Chemistry Midterm Review*** Name:

*Unit 1: Alchemy (Lessons 1-26); Smells Lessons 1-6* Date: Pd:

In order to study for the test, you should:

* Review all classroom outlines
* Review all vocabulary terms which are located at the end of each lesson in a list
* Look over all activity worksheets done for all lessons
* Read the lesson summaries found at the end of each lesson
* Review quizzes and homework assignments for all lessons

A periodic table will be provided. Calculators will not be needed/permitted.

The following are some sample review questions for each lesson. This worksheet is a selected review

and does NOT cover all material for the test. Also, be aware that you should review the concepts

learned in these lessons but will also be required to apply this knowledge on the test.

**LESSON 1: Lab Equipment & Safety**

1. List 3 pieces of lab safety equipment in the classroom and their uses.

2. Sketch a picture and describe the use of:

a) flask b) ring stand c) graduated cylinder

3. Draw and describe the setup used to separate a solid from a liquid in a *filtration*.

**LESSON 2: Introduction to Chemistry & Penny Lab**

4. How did alchemists contribute to the modern study of chemistry? What is chemistry?

5. In the Penny for your Thoughts Lab, what observations did you note about the appearance of the penny? Did we turn the penny into a precious metal?

**LESSON 3: Defining Matter**

6. List 3 examples of matter and 3 examples of things that are not matter.

7. In order to be classified as matter, a substance must have both \_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

8. Classify each of the following as matter or not matter:

a. air b. sound c. dust d. atoms

e. helium f. electricity g. happiness h. bacteria

**LESSON 4: Mass and Volume**

9. a) How is mass measured? What units are used for mass?

b) How is volume measured? What units are used for volume?

10. Water displacement is a process used to measure the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an object. Explain this process and draw a sketch depicting it.

11. a) A graduated cylinder contains 50.0 mL of water. b) Calculate the volume of a rectangular

A piece of metal is placed in the cylinder and the object with the dimensions of

water level rises to 72.0 mL. What is the volume of 2.5 cm x 4.5 cm x 4.0 cm

the object in mL? In cm3?

12. Draw two things with the same mass, but different volumes.

13. Draw two things with the same volume, but different masses.

**LESSON 5: Density**

14. The definition and formula for density are:

15. Density is an *intensive property*. What does this mean?

16. Calculate the density of an object with a mass of 18 g and a volume of 4.5 mL.

17. What is the volume of a metal object with a density of 11.4 g/cm3 and a mass of 17 g? Use page 19 to determine the identity of the metal.

18. What is the density of a brass brick? What is the density of a brass ring?

**LESSON 6: Chemical Names & Symbols**

19. Describe the difference between an element and a compound. Provide an example of each.

20. List the information provided by: NaNO3*(s)*

21. What is the difference between LiCl*(s)* and LiCl*(aq)*?

**LESSON 7: The Copper Cycle**

22. List the copper compounds (names & formulas) formed in each step of the copper cycle:

a) Solid copper powder was obtained:

b) Nitric acid, HNO3*(aq)*, was added:

c) Sodium hydroxide, NaOH*(aq)*, was added:

d) The solution was heated and filtered:

e) Sulfuric acid, H2SO4*(aq)*, was added:

23. What are some observations that indicate that a chemical change has occurred?

24. Why is adding nitric acid to copper a chemical reaction but a puddle evaporating is not?

**LESSON 8: Conservation of Matter**

25. How did the copper cycle lab show the law of conservation of matter? What is the law of conservation of matter?

**LESSON 9: Properties of the Elements**

26. How did Mendeleev organize his periodic table?

27. On a basic periodic table (like the one in our classroom), what information is provided in each element square?

28. Magnesium reacts with chlorine to form MgCl2. How will strontium react with chlorine? How do you know?

**LESSON 10: The Periodic Table**

29. What is the main difference between the organization of the modern periodic table and Mendeleev’s periodic table?

30. What are the names of Groups 1, 2, 17, and 18, respectively?

31. On the periodic table, be sure to know the location of:

atomic number group period

average atomic mass metals nonmetals

metalloids alkali metals noble gases

alkaline earth metals halogens transition metals

lanthanides actinides main group elements

**LESSON 11: Models of the Atom**

32. Sketch , name, and describe the main features of each scientist’s model of the atom:

a. Dalton b. Thomson

c. Rutherford d. Rutherford

e. Bohr f. Heisenberg, Chadwick

33. Why did the model of the atom change over time?

34. Draw and describe the simple atomic model. What are the charges of the subatomic particles?

**LESSON 12: Atomic Number and Atomic Mass**

35. Atomic number is the # of \_\_\_\_\_\_\_\_\_\_\_ in an atom and determines an atom’s identity.

36.

a. Fill in this block, showing the information from the periodic table for lithium.

b. How many protons are in an atom of lithium?

c. What is lithium’s atomic number?

d. How many protons, neutrons, and electrons are in a neutral lithium atom?

37. Complete the following table using a periodic table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Element** | **Symbol** | **Atomic**  **Number** | **Number of Protons** | **Number of Electrons** | **Number of Neutrons** | **Average Atomic Mass** |
| vanadium |  |  |  |  |  |  |
| chlorine ion | Cl- |  |  |  |  |  |
|  | P |  |  |  |  |  |

**LESSON 11: Models of the Atom**

38. What are the major features and scientists associated with:

a. Solid Sphere Model b. Plum Pudding Model c. Nuclear Model

d. Solar System Model e. Proton Model f. Electron Cloud Model

39. Sketch and label the simple atomic model that is used today.

**LESSON 12: Atomic Number and Atomic Mass**

40. What is the definition of atomic number? Where is it located on the periodic table?

41. Name the element:

a. atomic number 40 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ b. contains 12 protons \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

42. Name the atomic number:

a. iron: \_\_\_\_\_\_ b. barium \_\_\_\_\_\_\_ c. krypton \_\_\_\_\_\_\_

43. What are the atomic masses (in units of amu) of the two subatomic particles found in the nucleus?

44. Use the periodic table to estimate the atomic

masses of germanium, cobalt, and fluorine.

45. a. What is the average atomic mass listed on the periodic table for sodium? (Include all decimals)

b. What is the most common isotope of sodium: sodium-22 or sodium-23. Why?

**LESSON 13: Isotopes**

46. Chlorine exists as two isotopes. Chlorine is 76% chlorine-35 and 24% chlorine-37. Determine the average atomic mass of chlorine. (You are calculating a *weighted average* here).

47. How many protons and neutrons are in an atom of bromine-80?

48. What is the atomic number of an atom with 15 protons? What is the mass number of an atom with 15 protons and 16 neutrons?

**LESSON 14: Stable and Radioactive Isotopes**

49. Are radioactive isotopes stable or unstable? Why?

50. The ratio of \_\_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_ in an atom determines its stability.

51. Complete the following table: *(Use the periodic table for atomic numbers and element names/symbols only. Remember the mass on the periodic table is a weighted average atomic mass for all isotopes of an element…. whereas this table is referring to a single atom of an element. )*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Isotope Name | Isotope symbol | Atomic # | # of Protons | # of Neutrons | Mass # | # of Electrons |
| **lead-207** |  | **82** |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  | **48** |  | **113** |  |

**LESSON 15: Nuclear Reactions and LESSON 16: Formation of Elements**

52. Write a nuclear equation showing each of the following isotopes emitting a beta particle.

a. potassium-42

b. barium-136

53. Label the parent isotope and daughter isotope in Question 52.

54. Write a nuclear equation showing each of the following isotopes emitting an alpha particle.

a. platinum-180

b. bismuth-205

55. a. What are the symbols for alpha, beta, and gamma radiation?

b. Which is the most harmful and why?

c. Gamma radiation often accompanies the processes of: *Circle all that apply*

i. alpha decay iii. fission

ii. beta decay iv. fusion

56. The splitting apart of a nucleus is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Where does this process occur?

57. The joining of nuclei to form a larger nucleus is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Where does this process occur?

58. Suppose holmium-170 undergoes beta decay. The daughter isotope then also undergoes beta decay. What is the final product?

59. The only way to change one element into another is to change the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the nucleus.

**LESSON 17: TECHNICOLOR ATOMS – Flame Tests**

60. What was responsible for the different flame colors in this lab? (Try to draw a picture to describe movement of electrons in the atom and how this produces different colors.)

**LESSON 18: Valence and Core Electrons**

61. What is the difference between valence and core electrons?

62. In terms of electrons, what do fluorine, chlorine, and bromine have in common?

63. Why do elements in the same group have similar properties?

64. How many valence and core electrons are in a neutral atom of:

a. magnesium b. oxygen c. bromine

**LESSON 19: Ions**

65. Which noble gas do each of the following elements want to be like? Why do elements want to “be like the noble gases”?

a. sodium b. calcium d. aluminum e. oxygen

66. For each of the following elements, state whether the atom has to gain or lose electrons, the formula of the ion, and whether the ion is a cation or an anion.

a. beryllium b. nitrogen c. sulfur

67. How many protons, neutrons, and electrons are in:

a) Cl- b. Mg2+

**LESSON 20, 21, 22, & 23: Ionic Compounds, Formulas for Ionic Compounds, Polyatomic Ions, and Transition Metals**

68. What is an ionic compound?

69. How do the charges add up to zero in CaCl2?

70. Write the formula of the ionic compound forming between sodium and oxygen ions.

71. Write the names of:

a. KCl b. NaNO3 c. MgO d. Li2SO4 e. CoBr2

72. Write the formulas of:

a. potassium hydroxide b. aluminum sulfide

c. sodium fluoride d. calcium oxide

e. iron(III) chloride f. barium nitride

73. Write the cation and ion in:

a. lithium oxide b. Mn(OH)2

c. Al2O3 d. Cu2CO3

e. magnesium phosphate f. MgBr2

**LESSON 24: Electron Configurations**

74. How many subshells are there, their respective names, and how many electrons can each hold?

75. Write longhand and shorthand electron configurations for:

a. lithium b. copper c. sulfur

**LESSON 25 & 26**: **Classifying Substances and Bonding**

76. What type of bonding exists between:

a. metals

b. nonmetals

c. metals with nonmetals

77. Describe the location of electrons in each type of bonding. Sketch a picture to describe each.

78. Use bonding to explain why a network covalent solid will not dissolve while a molecular covalent solid will dissolve.

**SMELLS – UNIT 2**

**LESSON 1: Molecular Formulas**

1. Predict the smells of these molecules. Explain your reasoning.

a. hexylamine, C6H15N

b. pentyl acetate, C7H14O2

c. acetic acid, C2H4O2

2. What is similar about the molecular formulas of each type of smell:

a. minty b. fishy c. sweet

3. What is similar about the names of each type of smell:

a. minty b. fishy c. sweet

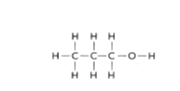
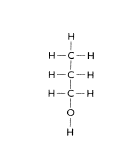
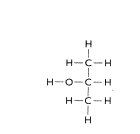
**LESSON 2: Structural formulas**

4. What is the difference between a molecular formula and a structural formula? Which type provides more information?

5. Draw 3 isomers of hexane, C6H14.

6. Draw 2 isomers of C5H10O

7. Are the following molecules isomers? Why or why not?



8. Two molecules have the same molecular formula yet one smells sweet and the other smells putrid. Explain how you think this might be possible.

**LESSON 3: Bonding Tendencies**

9. What is the HONC1234 rule?

10. Draw structural formulas for the following molecules, using the HONC1234 rule.

a. C4H11N c. C3H8O2

b. C2H6O d. CH4O

**LESSON 4: Lewis Dot Symbols**

11. What does a Lewis dot structure of a molecule show?

12. a)Draw the Lewis dot symbols for the following elements:

a. H b. N c. P d. F e. As

b) How many bonds will each element above form?

13. Draw Lewis dot structures for the following molecules. Determine how many lone pairs and

bonding pairs of electrons are in each.

a. SeBr2 b. HBr c. PF3 d. SiF4

**LESSON 5: Octet Rule**

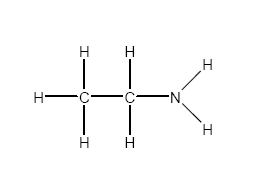
14. What is the octet rule?

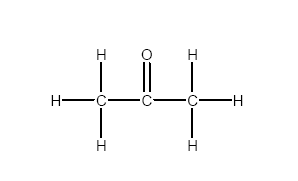
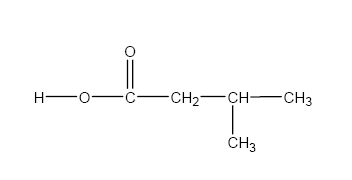
15. Draw a Lewis dot structure for NH3. Draw a structural formula for H2O, including lone pairs.

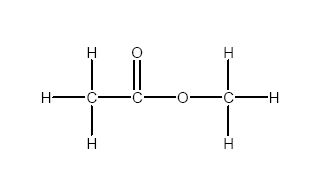
16. Draw the structural formula for HCN, making sure it follows the octet rule.

17. What is a double bond? A triple bond?

**LESSON 6: Functional Groups**

18. In the molecules below, circle the functional group, name the functional group, and determine the smell of the molecule, and write the molecular formula.

a.  b.

c. d.